

REMARKS

Claims 1-3 and 6-12 are pending in this application. By this Amendment, claims 1-3 are amended; claims 4 and 5 are canceled; and new claims 9-12 are added. Claim 4 is canceled to address a claim objection.

No new matter is added to the application by this Amendment. The language added to claim 1 finds support in canceled claim 5, as originally filed. New claims 9 and 10 find support in claim 7, as originally filed; and new claims 11 and 12 find support in claim 8, as originally filed.

Reconsideration of the application is respectfully requested.

I. Claim Objection

Claim 4 was objected to for alleged being of improper dependent form for failing to further limit the subjected matter of a previous claim.

In view of the cancellation of claim 4, Applicants submit that this claim objection is moot.

Accordingly, withdrawal of the objection to the claim is respectfully requested.

II. Rejection Under 35 U.S.C. 102

Claim 1, 2, 4 and 6-8 were rejected under 35 U.S.C. 102(b) as allegedly being anticipated by U.S. Patent No. 4,990,545 to Hourai et al. (Hourai). Applicants respectfully traverse this rejection.

Amended claim 1 incorporates the features of canceled claim 5, which was not rejected under 35 U.S.C. 102(b) as being allegedly anticipated by Hourai. By failing to reject claim 5 in view of Hourai, the Patent Office acknowledges that the Hourai does not teach or suggest the features of canceled claim 5.

Therefore, Applicants submit that Hourai does not teach or suggest a flame retardant coating composition having 10-30 wt% of a phosphorus-based flame retarding agent, 8-20 wt% of a flame retarding aid selected from antimony trioxide, antimony pentoxide, zinc borate, boric acid, paraffin wax or mixtures thereof as recited in amended claim 1.

Because these features of claim 1 are not taught or suggested by Hourai, Hourai would not have (1) anticipated the flame retardant coating composition of claim 1 and/or (2) rendered the features of claim 1 obvious to one of ordinary skill in the art.

In view of the foregoing, reconsideration and withdrawal of this rejection are respectfully requested.

III. Rejections Under 35 U.S.C. 103

A. Inukai et al.

Claims 1-8 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over U.S. Patent Publication No. 2001/0003764 to Inukai et al. (hereinafter "Inukai").

Applicants respectfully traverse this rejection.

Prior to discussing the merits of the Examiner's position, the undersigned reminds the Examiner that the determination of obviousness under § 103(a) requires consideration of the factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1 [148 USPQ 459] (1966): (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of nonobviousness. *McNeil-PPC, Inc. v. L. Perrigo Co.*, 337 F.3d 1362, 1368, 67 USPQ2d 1649, 1653 (Fed. Cir. 2003). There must be some suggestion, teaching, or motivation arising from what the prior art would have taught a person of

ordinary skill in the field of the invention to make the proposed changes to the reference. *In re Fine*, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). But see also *KSR International Co. v. Teleflex Inc.*, 82 USPQ2D 1385 (U.S. 2007).

A methodology for the analysis of obviousness was set out in *In re Kotzab*, 217 F.3d 1365, 1369-70, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000) A critical step in analyzing the patentability of claims pursuant to section 103(a) is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher."

It must also be shown that one having ordinary skill in the art would reasonably have expected any proposed changes to a prior art reference would have been successful.

Amgen, Inc. v. Chugai Pharmaceutical Co., 927 F.2d 1200, 1207, 18 USPQ2d 1016, 1022 (Fed. Cir. 1991); *In re O'Farrell*, 853 F.2d 894, 903-04, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988); *In re Clinton*, 527 F.2d 1226, 1228, 188 USPQ 365, 367 (CCPA 1976).

"Both the suggestion and the expectation of success must be founded in the prior art, not in the applicant's disclosure." *In re Dow Chem. Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988).

The Patent Office acknowledges that Inukai fails to teach or suggest the specific concentration of the flame retarding agent, a flame retarding aid and an additive (see page 4 of the Office Action). The Patent Office alleges that these additives are commonly utilized

additives which one of ordinary skill in the art would be able to add at an appropriate concentration, determining by the process of linear experimentation a value that was large enough to have the desired effect but small enough not to significantly impair the properties of the composition. Applicants respectfully disagree with these allegations.

Claim 1 requires a flame retardant coating composition comprising 10-30 wt% of a phosphorus-based flame retarding agent and 8-20 wt% of a flame retarding aid selected from antimony trioxide, antimony pentoxide, zinc borate, boric acid, paraffin wax or mixtures thereof. In contrast, Inukai does not teach or suggest a flame retarding agent that is a phosphorus-based flame retarding agent.

The flame retarding aid according to the present invention is not flame proof itself, but acts to further increase a fireproofing effect when used together with the phosphorus-based flame retarding agent (see page 5, lines 9 to 23 of the present application). On the other hand, Inukai fails to disclose the flame-retardant additives.

The flame retardant coating composition in the present invention comprises a phosphorus-based flame retarding agent and a flame retarding aid, which improves the fireproofing effect when used together. Attached are copies and partial English-language translations of (1) a Final Report (hereinafter, referred to as “R1”) on Technology Innovation Projects for Small and Medium Enterprises, commissioned by the Korean Small and Medium Business Administration on March 1, 2003, and (2) a published paper by SeungHyun Cho, Jin-Wook Ha, entitled “*A Study on the Synthesis of Organic/Inorganic Flame Retardant and Its Application*”, [Korea Advanced Institute of Science, Vol. 4, No. 3, pp. 2 18-222, 2003] (hereinafter, referred to as “R2”), which were presented by the present inventors. Table 12 of R1 and Table 6 of R2 illustrate results

of adhesion and flame retardancy tests that were conducted while increasing the ratio of phosphorus-based flame retardant AF100 S from 0.2 to 1.0 at a fixed $\text{Mg}(\text{OH})_2$: zinc borate ratio of 1 : 0.3.

The phosphorus-based flame retardant AF100 S is an ammonium phosphate dibasic, as described in the attached Material Safety Data Sheet (MSDS, hereinafter, referred to as "R3") and provided by JS Chemical Corporation. As shown in Table 12 of R1 and Table 6 of R2, a flame retardant effect is shown when the ratio of AF100 S : $\text{Mg}(\text{OH})_2$: zinc borate is greater than 0.6 : 1 : 0.3.

However, as shown in Table 11 of R1 and Table 5 of R2 for use of a $\text{Mg}(\text{OH})_2$ /zinc borate flame retardant mixture containing no phosphorus-based flame retardant, the flame retardant effect is reduced when the ratio of zinc borate : $\text{Mg}(\text{OH})_2$ is greater than 0.7 : 1.

Therefore, in the case where the $\text{Mg}(\text{OH})_2$ /zinc borate mixture containing no phosphorus-based flame retardant was used as a flame retardant, no flame retardant effect was shown when the mixing ratio of zinc borate : $\text{Mg}(\text{OH})_2$ was greater than 0.7 : 1. However, in the case where the phosphorus-based flame retardant was used, a flame retardant effect was shown, even when the amount of phosphorus-based flame retardant added was more than a certain amount of 0.6 of the ratio of AF100 S : $\text{Mg}(\text{OH})_2$: zinc borate . Thus, it can be seen that a flame-retardant coating composition containing the phosphorus-based flame retardant is more effective than a flame-retardant coating composition containing no phosphorus-based flame retardant.

Meanwhile, with regard to the content of a phosphorus-based flame retardant in a flame-retardant coating composition according to the present invention, as shown in Table 7 of R1 and Table 1 of R2, the content of a flame retardant is described as being 15-30 wt%

based on the total weight of the flame-retardant coating composition. In Table 12 of R1 and Table 6 of R2, the phosphorus-based flame retardant AF100 S is described as being contained in the flame-retardant mixture [$\text{Mg}(\text{OH})_2$: zinc borate : AF100 S] at a ratio of 1 ($\text{Mg}(\text{OH})_2$): 0.3 (zinc borate): 0.2-1.0 (AF100 S).

These results indicated that the phosphorus-based flame retardant AF100 S is contained in an amount of 13-43 wt% based on the weight of the flame retardant mixture. Specifically, when the flame retardant mixture is contained in an amount of 31-43 wt% of the phosphorus-based flame retardant based on the weight of the flame retardant mixture, the phosphorus-based flame retardant is contained in an amount of 9.3-13 wt% based on the weight of the flame retardant coating composition.

Thus, as shown in Table 12 of R1 and Table 6 of R2, when a content of the phosphorus-based flame retardant in the flame retardant coating composition is in a range of 7.6 wt% [i.e., $\text{Mg}(\text{OH})_2$: Zinc Borate : AF100 S ratio of 1 : 0.3 : 0.4], the flame retardant mixture has good adhesion, but no flame retardancy. However, when the content of the phosphorus-based flame retardant in the flame retardant coating composition is in the range of 13 wt% [$\text{Mg}(\text{OH})_2$: zinc borate : AF100 S ratio of 1 : 0.3 : 1.0], the flame retardant mixture shows not only adhesion, but also flame retardancy.

Accordingly, it can be seen that when the flame retardant mixture according to the present invention is contained in an amount of 10-30 wt% based on the weight of the flame-retardant coating composition, the flame-retardant coating composition exhibits both flame retardancy and adhesion.

Moreover, Inukai does not teach or suggest a flame retardant coating composition comprising 10-30 wt% of a phosphorus-based flame retarding agent and 8-20 wt% of a

flame retarding aid selected from antimony trioxide, antimony pentoxide, zinc borate, boric acid, paraffin wax or mixtures thereof as required by claim 1.

Because these features of claim 1 are not taught or suggested by Inukai, Inukai would not have rendered the features of claim 1 obvious to one of ordinary skill in the art.

In view of the foregoing, reconsideration and withdrawal of this rejection are respectfully requested.

B. Inukai in view of Wypych and Imahashi

Claim 5 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Hourai or Inukai in view of Handbook of Fillers – A Definitive User’s Guide and Databook, 2nd Edition, 2000, pages 26-30 and 171, to George Wypych and U.S. Patent No. 5,777,018 to Imahashi. This rejection is respectfully traversed.

In view of the cancellation of claim 5, Applicants submit that this claim rejection is moot.

Accordingly, withdrawal of the objection to the claim is respectfully requested.

IV. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-3 and 6-12 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Early and favorable action is earnestly solicited.

